ORIGINAL RESEARCH

Functional outcome of trimalleolar fracture stabilized by dual approach: Retrospective analysis

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ABSTRACT
Concept of treatment of trimalleolar fracture is evolved from conservative treatment to open reduction and internal fixationall the research focuses on posterior malleoli fixation either with screws or plate depending on the size of theposterior malleoli fragment none of the studies have taken the direction of subluxation or dislocation ankle joint. Talus lie in the ankle mortise because of the stability provided by the anterior and posterior structures posteriorly posterior tibiofibularsyndesmtic ligament if injured it should be anatomically reduced and stabilized with palte or lag principle. All surgically managed patients with tri-malleolar fracture of the ankle satisfying the inclusion criteria admitted from 2017 to 2022 in Basaveshwara Medical College and Hospital, Chitradurga were included in the study. We used the AOFAS (American Orthopaedic Foot and Ankle society score) scoring system which is a self-reported outcome measurement for the evaluation of the outcome of the management at 3 month, 6 month and 1 year follow-up post operatively. Using appropriate statistical methods, we assessed the pattern of recovery of ankle function.

Key words: Functional outcome, trimalleolar fracture, dual approach

INTRODUCTION

Although the incidence of trimalleolar ankle fractures is comparatively less, nevertheless, these are disabling injuries if not managed appropriately. It is well described in the literature that ankle fractures involving posterior malleolar component tend to do clinically and functionally worse as compared to other ankle fractures[1].Recently, studies have stated that anatomical reduction and fixation of the posterior malleolus should be carried out in all cases of trimalleolar fracture irrespective of its size and type to obtain a good clinical and functional outcome. According to the mechanics of such an injury, the posterior malleolus fragment is an avulsion fracture due to rupture of the PITFL. It constitutes stage 3 of the injury pattern to the ankle ring after involving the rupture of the anterior tibiofibular ligament (stage 1) and an oblique fracture of the distal fibula (stage 2)[2].In our study, we conducted a preoperative computed tomography (CT) scan in all our cases to better understand the fracture configuration and plan our fixation. The calculation of the fragment size is better on a sagittal CT of the ankle joint rather than only on a plain lateral ankle radiograph[3, 4].

METHODOLOGY

All surgically managed patients with tri-malleolar fracture of the ankle satisfying the inclusion criteria admitted from 2017 to 2022 in Basaveshwara Medical College and Hospital, Chitradurga were included in the study.
Total Number of patients-30.

Inclusion Criteria

- Adults in the age group of >20 years of age.
- Radiographically confirmed tri-malleolar fracture of the ankle.
- Those willing to give consent.
- Patients without intra-operative or immediate post-operative complications.

Exclusion Criteria

- Age < 20 years.
- Open fractures of Ankle.

- Polytrauma patients.
- Pathological Fractures.
- Ankle fractures without involvement of posterior malleolus.

We conducted a retrospective analysis on patients who were admitted from 2017 to 2022.

We used the AOFAS (American Orthopaedic Foot and Ankle society score) scoring system which is a self-reported outcome measurement for the evaluation of the outcome of the management at 3 month, 6 month and 1 year follow-up post operatively. Using appropriate statistical methods, we assessed the pattern of recovery of ankle function.

Results

Table1: Comparison of mean AOFAS scores between different time intervals

Time	Number	Mean	Standard Deviation
3 months	30	64.76	7.7
6 months	30	83.30	7.8
1 year	30	88.34	3.8

p Value-0.001

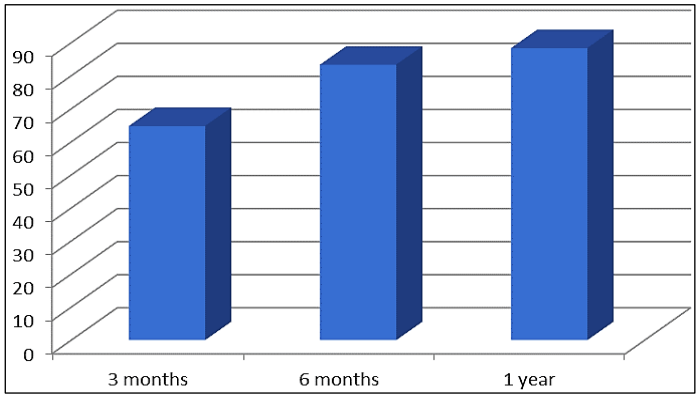

Fig 1: Mean AOFAS score

Table2: Comparison of Range AOFAS scores between different time intervals

Time	Number	Min	Max
3 months	30	54	82
6 months	30	70	90
1 year	30	86	98

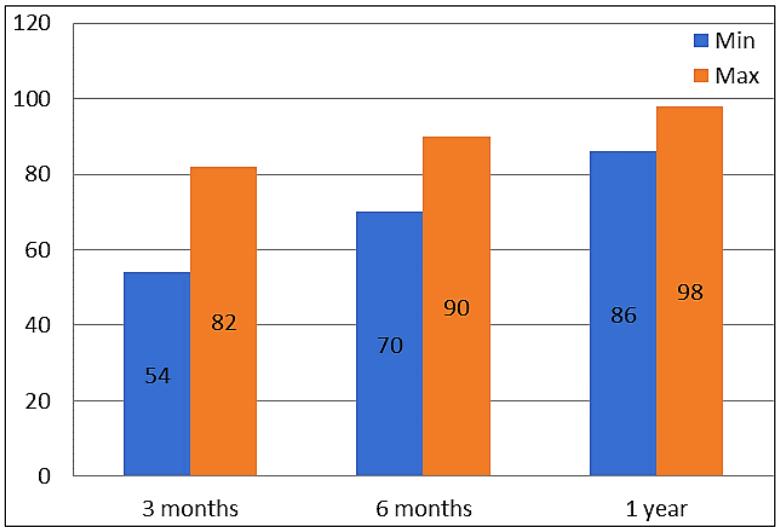

Fig2:AOFAS range

DISCUSSION

The majority of posterior malleolar fractures can be reduced and fixed directly via a posterolateral approach. This approach is particularly useful with relatively small posterior malleolar fragments and in the presence of intercalary fragments or impacted plafond fragments that are not amenable to indirect reduction as regularly seen in Bartonicek and

Rammelt Type-2 and 3 fractures. A concomitant distal fibular fracture can be reduced and stabilized with a posterior anti-glide plate via the same incision[5].

The patient is placed in the prone position. A longitudinal incision is made halfway between the distal part of the fibula and the Achilles tendon. The sural nerve is protected in the subcutaneous tissue. The superficial and deep fascia are dissected. An interval is created bluntly between the flexor hallucislongus and the peroneal muscles. Care must be taken not to injure the peroneal artery that perforates the interosseous membrane 6 cm proximal to the ankle joint. The posterolateral fragment is gently mobilized and hinged on the PITFL. The metaphyseal fracture line is used as a reference for reduction. Intercalary and impacted joint fragments of sufficient size and cartilage quality are reduced toward the tibial plafond using the talus as a template and fixed with buried Kirschner wires or resorbable pins.

A posteromedial approach enables access to the posterior tibial rim and the medial malleolus. It is especially useful in certain Bartonìcék and Rammelt Type-3 fractures with medial displacement[6].

The patient is placed in the prone position. The incision runs longitudinally halfway between the Achilles tendon and the medial malleolus. After entering the fascia, the posteromedial neurovascular bundle is identified and gently retracted medially along with the flexor digitorumlongus and posterior tibial tendons, while the flexor hallucislongus tendon is retracted laterally39. Reduction and fixation of the posterior tibial fragment is performed analogously to the posterolateralapproach [7].

The fixation of posterior malleolar fractures aims to achieve bone-to-bone restoration of syndesmotic stability. From the available literature, posterior malleolar fixation seems to obviate the need for additional syndesmotic fixation in a substantial number of cases. This is of particular interest because the presence of a syndesmotic injury requiring fixation is strongly associated with inferior outcomes. [8]With a posterolateral approach, superficial wound infection was reported in 5% and deep infection requiring revision surgery in 1% of cases in 1 systematic review. The authors of 1 study reported temporary numbness at the lateral part of both the heel and forefoot, suggesting neurapraxia of the sural nerve, in 4% of cases. Malalignment of posterior malleolar fragments, as defined as a step-off of >/=2 mm in the articular surface, has been reported after operative treatment in up to 42% of cases, mostly following indirect reduction and percutaneous screw fixation. Several studies demonstrated a significantly higher quality of reduction (p = 0.001) with direct posterior malleolar fixation via posterior approaches compared with indirect reduction and percutaneous anterior-to- posterior screw fixation[9, 10].Owing to the overall reduced complication rate and better fracture reduction when compared to indirect screw fixation technique, plating using the posterolateral, posteromedial or a combination of both approaches seems to appear to be a more viable option for surgically managing tri-malleolar fractures of the ankle. There are numerous studies on both posterolateral approach and posteromedial approach, however studies on utilizing dual approach, i.e., combination of posteromedial and posterolateral approach and the outcomes are lacking.

Thus, we performed this study to assess the functional outcomes of tri-malleolar fractures of the ankle treated by plating of posterior and lateral malleoli by posterolateral approach and medial malleoli by posterior approach.

CONCLUSION

This study recommends fixation of the posterior malleolus first, then lateral malleolus and finally medial malleolus in Trimalleolar ankle fractures with an experienced surgeon.

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